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LIVE PREY TO YOUNG RAPTORS—INCIDENTAL OR ADAPTIVE?

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ABSTRACT.—Raptors sometimes bring prey that is still alive to their nests, or potential prey may blunder into raptor nests or result from competition for a nest. Such delivery of live prey seems incidental or accidental and non-adaptive: the live prey sometimes escapes. When live prey is a nestling bird it may be "adopted" and even reared, thus providing insights into parental behavior and to similar behavior among captives. Raptors that catch flying prey often drop prey near their fledged young, which the latter catch or attempt to catch in midair. In one species, the Peregrine Falcon (*Falco peregrinus*), such dropped prey regularly includes some living birds.

Presas vivas para rapaces juveniles—accidental o adapativo?

RESUMEN.—Algunas veces las aves rapaces llevan presas aún vivas a sus nidos, estas pueden constituir un despropósito en los nidos de las rapaces o generar una competencia por el nido. Tal liberación de la presa viva parece accidental y no adaptativa: la presa algunas veces escapa. Cuando la presa viva es un polluelo, este puede ser adoptado y hasta criado, proveyendo conductas parentales entre los cautivos. Las rapaces que capturan presas voladoras a menudo dejan caer la presa cerca de sus juveniles, las que más tarde captura o intenta capturar en el aire. En *Falco peregrinus,* regularmente las presas incluyen algunas aves vivas.

[Traducción de Ivan Lazo]

Scattered observations exist of raptors bringing live prey to their nestlings. All classes of prey are represented except mammals, perhaps because the latter might bite and injure both adult and immature raptors. We have not found instances for owls but their nocturnal habits and frequent use of cavities for nesting make observations difficult.

Live prey may be in raptor nests for diverse reasons or under varying circumstances. Our objective was to enumerate these reasons, give examples of each, and discuss whether any of them are adaptive to raptors. Instances of live prey being "adopted" by raptors are also evaluated. Presentation of prey, alive or dead, to fledged raptors is also considered.

OBSERVATIONS

Adventitious Occurrences. Potential living prey—reptiles, birds, mammals—may occasionally blunder into a raptor's nest. Weaver finches (*Passer*) and grackles (*Quiscula*) sometimes breed in the base of large hawk nests; their young might flutter into the raptor's nest. Occasionally two raptor species compete for the same nest and brood mix-ups occur. Mikkola (1983:164) wrote: "Even if a female Ural Owl (*Strix uralensis*) has already laid her eggs in her chosen nest, she remains highly vulnerable to the attentions of a nest-hunting Goshawk (*Accipiter gentilis*)." One nest contained three eggs of the hawk and one of the owl. All four were incubated by the goshawk. "On 23 May the nest contained a newly hatched Ural Owl chick and three eggs of the (then) real owners . . . the owlet soon disappeared and on the 8th June the nest contained only three goshawk nestlings."

S.K. Sherrod (pers. comm.) was told by Russian naturalist, R. Pfeffer, of finding a young Northern Raven (*Corvus corax*) in the nest of a Golden Eagle (*Aquila chrysaetos*). Both species had shown interest in the nest and Pfeffer assumed that the ravens had laid eggs before being evicted, one of which was hatched by the eagle. Or perhaps one of the eagles had brought the raven to the nest (see below).

Instances Involving Insects and Lower Vertebrates. After intensive study of Mauritius Kestrels

(*Falco punctatus*) in the field and captivity, C.G. Jones (pers. comm.) wrote: "We now have about 10 records of kestrels delivering live or twitching prey to the nest. All that I can recall were when the kestrels were rearing well-grown young. I have seen many hundreds of prey items delivered to the nest during the incubating phase and if my memory serves me correctly, none of these (geckos, *Phelsuma*) were alive. Large insects, such as locusts and dragonflies, are not usually delivered to the nestlings until their last week or so in the nest. Some of these insects are very much alive when they are brought to the nest."

At a nest of the Chanting Goshawk (*Melierax canorus*) the male brought a live agama lizard " . . . which he deposited on the nest where it lay feigning death. When the female leant forward to pick it up a while later, the agama came to life and dived over the nest edge, pursued by the female, but it escaped" (Steyn and Myburgh 1992).

Tenneson (1992) stated that living snakes are not infrequently brought to the "nest" of the ophiophagous Laughing Falcon (*Herpetotheres cachinnans*) but also found that surplus snakes are draped over boughs at the nest site. Obviously these snakes could not be alive. This falcon promptly dispatches venomous snakes, which comprise a substantial portion of its food. It is possible, therefore, that the living snakes observed were "more dead than alive." Poikilothermic vertebrates may flap or writhe for some time after "death," so a precise distinction is sometimes impossible. Fish sometimes flop over the side of a Bald Eagle's (*Haliaeetus leucocephalus*) nest, or turtles walk over its rim (Palmer 1988:215). In such cases, failure to kill the prey results in its loss.

Live Birds Brought to Raptor Nests without Receiving Parental Care. A Cooper's Hawk (*Accipiter cooperii*) brought two living, nestling Scarlet Tanagers (*Piranga olivacea*) to its nest (Meng 1959). One of three quelea finches (*Quelea*) brought to a brood of Taita Falcons (*Falco fasciinucha*) was alive (Hartley et al. 1993).

At several nests of the Australian Square-tailed Kite (*Lophoictinia isura*), food brought to the kite nestlings consisted entirely of nestling birds. A friarbird (*Philemon* sp.) was alive when delivered by the male; the female kite seized it at once and began to feed it to her chicks (Cupper and Cupper 1981). In the related but larger Black-breasted Kite, (*Hamirostra melanosternon*), the food includes large lizards and some nestling birds, both living and dead. Two living prey were chicks of other species of raptors: a Black Kite (*Milvus migrans*) and an Australian Kestrel (*Falco cenchroides*). Both were pinned down by the Black-breasted Kite and fed to her chicks but not until after the young kestrel had repulsed a kite nestling by raking it with its talons (but see below).

Gossett and Smith (1993) found a living, uninjured passerine chick in a nest of the Ferruginous Hawk (*Buteo regalis*), which contained two young Ferruginous Hawks more than a week old. The hawks' nest was on a metal tower and the observers thought that the passerine must have been brought there by one of the hawks. The next day they found only a wing quill of the foreign nestling.

Living Birds Brought as Prey but Receiving Parental Care. On 3 June 1960, one of us (WRS) watched a female Golden Eagle incubating her single egg at a nest in Maine. The following day she was moving restlessly and often peered into the nest. Probably the chick was cheeping within the egg. At 0515 H the next morning the female eagle was attempting to feed a nestling, a partly feathered American Crow (*Corvus brachyrhynchos*), which she later moved back under her when it tottered across the nest. The eaglet was hatching. A week later the eaglet was there along with a few black feathers, presumably from the hapless crow. The nearest site for American Crows was a valley about 7 km away.

The following remarkable events were observed and photographed at nests of the Black-breasted Kite (Cupper 1977, Cupper and Cupper 1981). On 8 October one attended nest was empty, two others held eggs. On 7 November the previously empty nest held two chicks. Although the time interval seemed too short to lay and hatch a clutch of eggs (and the chicks were very small), it was assumed the young must have been kites. Food remains in the nest proved to be legs of Australian Kestrels. On the next visit 20 days later, a young kestrel with some down on its head fluttered about the base of the nest tree; a second fledgling flew down from the tree and gave a distraction display. The next day, along with the female kite, there were four young kestrels of varying ages in the nest; later three more flew in. An adult kite, presumably the male, arrived with another young kestrel, this one dead. The chicks fed on it. The next day the kites were brooding and feeding their adopted kestrels of various ages. Evidently the male Black-breasted Kite had formed a search image on kestrels. He brought in many young ones, some dead, some alive. The female kite began to feed and rear the

young kestrels, and there was no indication that she ever laid eggs.

Over a period of years, Watson et al. (1993) examined more than 600 nests of Bald Eagles in the Puget Sound area. Three of them (two at the same nest in alternate years) each contained a living nestling Red-tailed Hawk (*Buteo jamaicensis*) and in two of these the young hawks fledged; it was not determined how the young hawks fared after fledging. The observations were from a helicopter, but photographs were taken. The hawks were always younger than the eaglets in the same nest, and the observers concluded that the hawks must have been brought to the nest by one of the eagles. A nest of the Bald Eagle in Michigan also contained a healthy, recently fed Red-tailed Hawk chick about a month younger than two eaglets in the nest. A photograph shows the hawk at one side of the nest; the eaglets at the other. No further observations were possible and the outcome was not known (Stefanek et al. 1992).

In one astounding incident, a pair of American Kestrels (*Falco sparverius*) lost their brood in a nest box, apparently to a mammalian predator (Tlusty and Hamerstrom 1992). The kestrels then transferred their attention to a box 1.1 km away which contained a brood of young European Starlings (*Sturnus vulgaris*). The kestrels repulsed the parent starlings and adopted and fed the young starlings on mice and other items, entering the nest box to tear the prey to pieces.

Living Birds Brought to Raptor Fledglings. In several species adults fly near young which have fledged or are about to, carrying prey conspicuously presented. The fledglings often fly out and seize such prey or attempt to catch it in midair if the adult drops it. The next step would be the similar presentation of living, perhaps incapacitated, prey. Sherrod (1983) who spent days observing recently fledged Peregrine Falcons (*Falco peregrinus*) found that living birds, as well as dead ones, are indeed dropped for the young to pursue. If a flying prey escapes the sallies of the fledglings, an adult may recapture it, carry it aloft again, and release it still alive. Living birds thus presented are mostly small species but range up to the size of the Rock Dove (*Columba livia*).

Pursuit of living prey must accelerate the acquisition of foraging techniques in these young falcons. Probably similar behavior will be found in other species of the genus *Falco* that catch birds in midair pursuit. Dropping of live prey has been observed at least twice in the New Zealand Falcon (*Falco novaeseelandiae*; Lawrence and Gay 1991). After its young have fledged the Eurasian Sparrowhawk (*Accipiter nisus*) drops birds for them to catch, but very rarely does one of these prey items show signs of life (Newton 1986:208). In the related Cooper's Hawk, H. McElroy (pers. comm.) saw an adult carrying a bird fly in among the branches of a tree where its brood were perched. It dropped a live bird which fluttered down at an angle and was caught by one of the immatures. More observations are needed to be sure that such use of living birds is established behavior in accipiters or other species of somewhat similar habits.

Bent (1937:155) quotes a correspondent who reported a Red-tailed Hawk dropping live mice to its young; they attempted to catch them in midair "with fair success." This requires confirmation.

DISCUSSION

As indicated, the delivery of living prey to raptor nestlings is so rare as to suggest that it is incidental and non-adaptive. Living prey sometimes escapes. Nestling raptors have never been seen to manipulate living prey as do the young of a few kinds of mammals, such as cats (Felidae). To do so in an elevated nest might result in some of the young raptors falling to their death. The Mauritius Kestrel may be an exception. It brings living insects to its young only when they are well grown. The species is a cavity nester so the danger of the young falling from the nest would be less than in an open nest.

All the records of living birds brought as prey to raptor nests were nestlings. This might suggest that if adults were brought, they would escape or be quickly killed. Nestling birds are incompletely feathered. They need not be deplumed before taking them to the nest and in the process killed and often decapitated as are adult prey. I. Newton (pers. comm.) concluded that not infrequently birds captured by the Eurasian Sparrowhawk are still alive at the time the hawk arrives with them at its plucking post. Nestlings, on the other hand, may be taken directly to the nest.

When large, vigorous and sometimes potentially dangerous prey is caught, "Cooper's Hawk—like other accipiters (and hawks in general)—will respond to movement of the prey by strongly grasping it, then relaxing their grip, then clamping down again" (Palmer 1988:350). Nestlings will be less apt

to trigger such killing reactions. Still, it does seem remarkable that Bald Eagles on four known occasions have brought small, nestling Red-tailed Hawks to their nest alive.

S.K. Sherrod (pers. comm.) makes the further interesting suggestion that if nestling raptors perceive an approaching winged predator as a parent and begin to vocalize, it might set up conflicting stimuli causing the predator to carry off one of the young without killing it. All of the young hawks in Bald Eagle nests were Red-tailed Hawks but this is a large conspicuous species which often nests in somewhat exposed sites. Red-tailed Hawk chicks (and adults?) do occasionally appear as prey items in Bald Eagle nests (W.S. Clark pers. comm.).

After fledging, young raptors are no longer in danger of falling. Yet the regular presentation of living prey, even at that stage, has been established as yet only in the Peregrine Falcon. Many raptors secure most of their food, such as rodents, on the ground. Nevertheless, none of them are known to provide living prey to their fledglings on the ground as do a few mammals. Probably this is because inexperienced hawks conspicuously engaged with living prey might attract larger predators. When a trained falcon brings its quarry to the ground and struggles with it, falconers dash to save their bird as they know it may be killed by other predators. The presentation of living prey to raptor fledglings on the ground could thus be maladaptive.

Although the delivery of living birds as prey to raptor nestlings is probably incidental, it assumes some interest when the prey is a young bird which begs for food and is "adopted," fed, and even reared to fledging. Hawks do not always recognize their own young. Recently fledged Ospreys (*Pandion haliaetus*), for example, sometimes visit neighboring Osprey nests and successfully beg for food, sometimes intimidating younger Ospreys in doing so (Poole 1989:111). The same apparently occurs in the Eurasian Sparrowhawk (Newton 1986:210). That Bald Eagles have reared both their own young and young Red-tailed Hawks, a third or a quarter of the size of the eaglets, indicates how indiscriminate the instinct to feed a begging chick may be. Extensive studies on captive breeding of many raptors has shown that when physiologically prepared for breeding, they often readily adopt alien chicks, sometimes even halting incubation and perhaps inhibiting egg-laying to do so.

Research on parental care is presently an active field (Winkler 1992). Raptors are a group in which observations and experiments can be carried out both in captivity and in the field, and in which there is a wide range of behavior.

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REQUEST FOR INFORMATION

Dieter Schmidl is preparing a book on the Red-naped Shahin (*Falco pelegrinoides babylonicus*) also called the Russett-headed Falcon (*F. pelegrinus babylonicus*) or Desert Peregrine Falcon (*F. peregrinus babylonicus*). Schmidl requests the following information on the species: literature mentioning this falcon, e.g., from handbooks, checklists, expedition reports, etc.; published or unpublished manuscripts with observations of, for example, breeding records and sightings; addresses of institutions or persons engaged in the study of this falcon; and information on museum specimens. All contributions will be acknowledged and contributors will be informed about publication date of the book.—**Dieter Schmidl, Max-Planck-Institut, D-82319 Seewiesen, Germany. FAX (8157)-29209.**